

## ABSTRACT

A silicon carbide semi-insulating epitaxy layer is used to create power devices and integrated circuits having significant performance advantages over conventional devices. A silicon carbide semi-insulating layer is formed on a substrate, such as a conducting substrate, and one or more semiconducting devices are formed on the silicon carbide semi-insulating layer. The silicon carbide semi-insulating layer, which includes, for example, 4H or 6H silicon carbide, is formed using a compensating material, the compensating material being selected depending on preferred characteristics for the semi-insulating layer. The compensating material includes, for example, boron, vanadium, chromium, or germanium. Use of a silicon carbide semi-insulating layer provides insulating advantages and improved thermal performance for high power and high frequency semiconductor applications.